

Ecological Dynamics of Blackbrush (*Coleogyne ramosissima*): An Iconic Landscape Dominant



Rosemary Pendleton

Burton Pendleton

Susan Meyer

Bryce Richardson

Todd Esque

Stan Kitchen

Arches National
Monument





Pocket mouse



Desert bighorn sheep



Grand Canyon

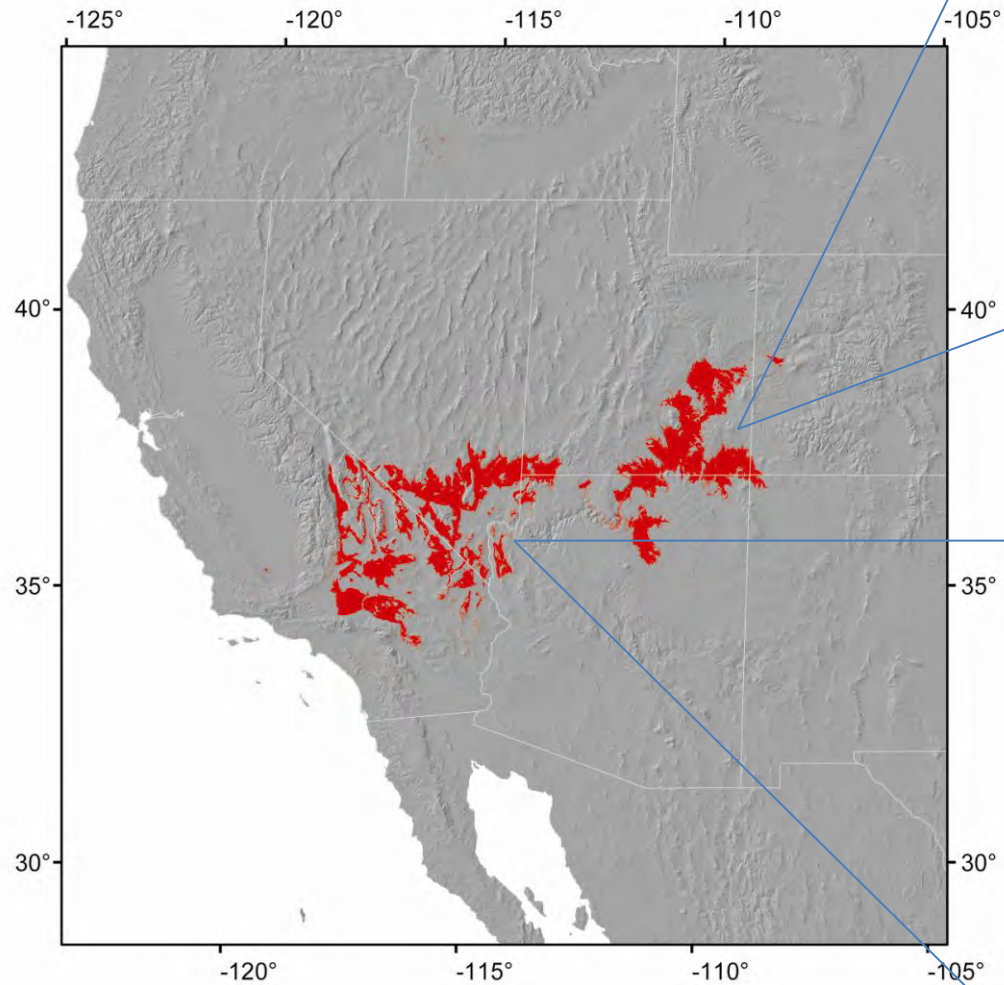


Desert Tortoise



Kangaroo rat

Distribution

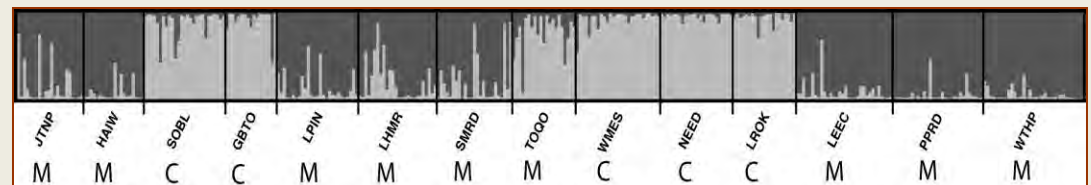
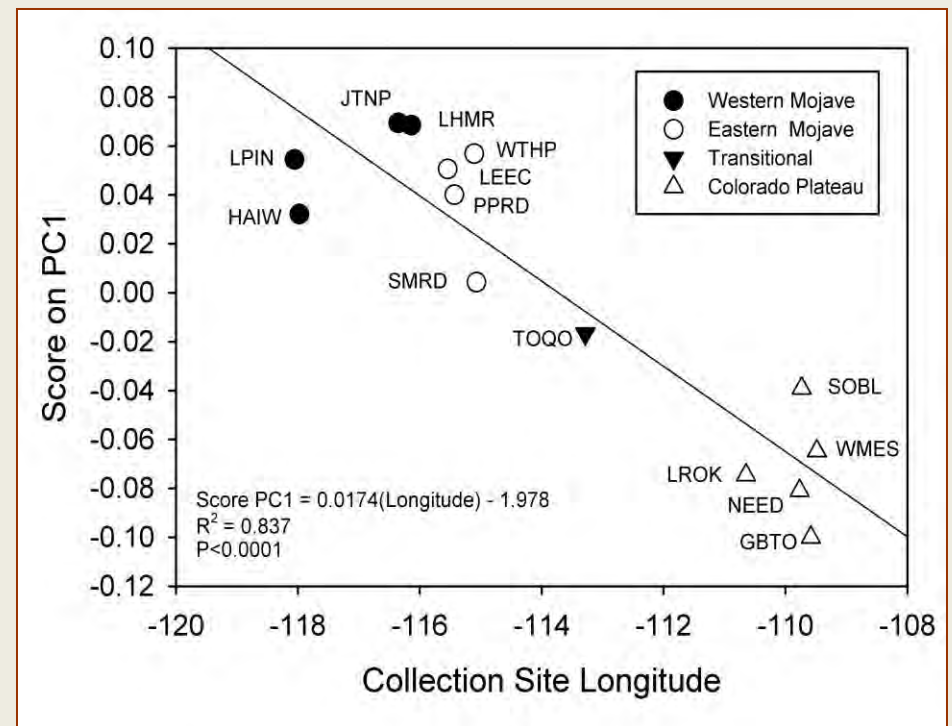
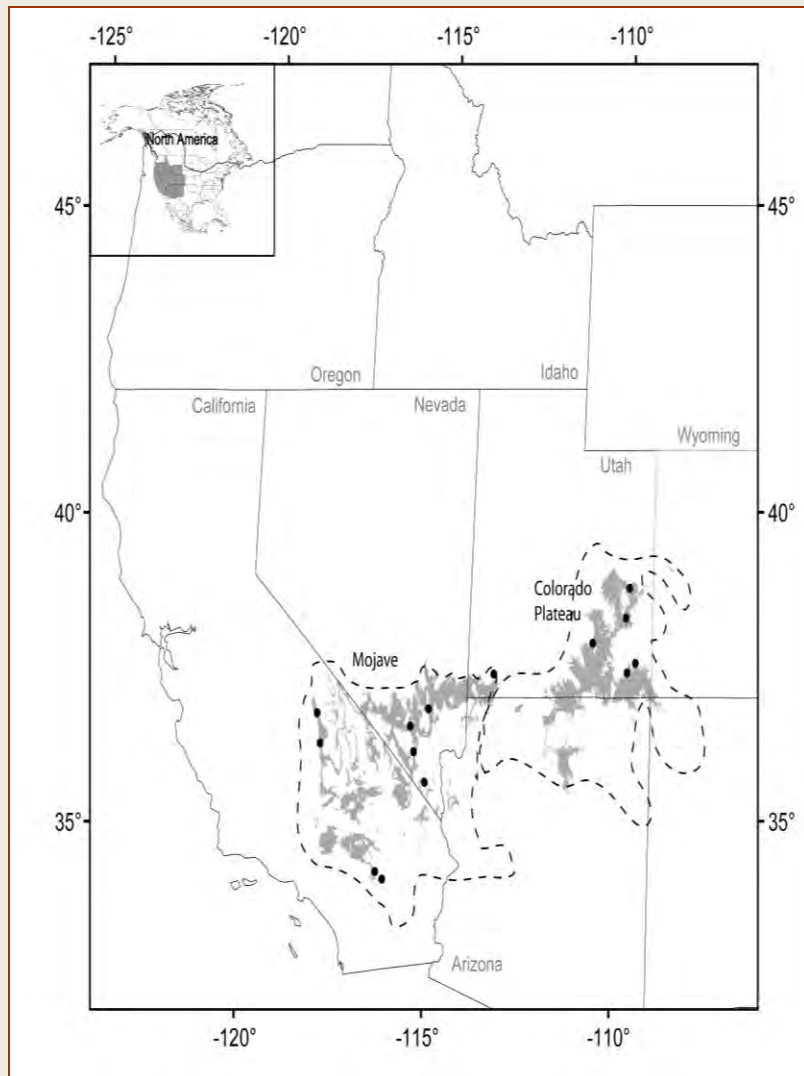


Bioclimatological distribution model
- Bryce Richardson

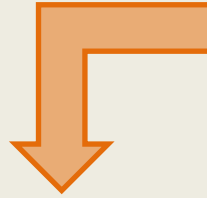
Current Research: genetics

“Paleoclimate effects and geographic barriers shape regional population genetic structure of blackbrush (*Coleogyne ramosissima*: Rosaceae)”

Richardson and Meyer – in review



Imperiled Landscape!



Credit: Matt Brooks

A burning blackbrush stand with flames over 15 feet high.



Credit: Matt Brooks

Field crew measuring plant community variables in a blackbrush stand where non-native annual grass fuels are greater than 1,000 pounds per acre.



**Blackbrush Shrublands:
Fire Conditions and Solutions in
the Mojave Desert**
Fire Science Brief June 2009



Credit: Matt Brooks

Fire's aftermath

“*Cheatgrass* (*Bromus tectorum*) has drastically altered landscapes in *Canyonlands*”
-- (nps.gov)



“In Canyonlands, cheatgrass (*Bromus tectorum*), an annual grass from Eurasia, can be found almost everywhere there is soil.”

-- *An unwelcome guest* (nps.gov)



- What can we learn from the ecology of blackbrush that can help in restoration efforts?
- Why doesn't blackbrush recover from large-scale fire?
- What might be the effects of climate change?



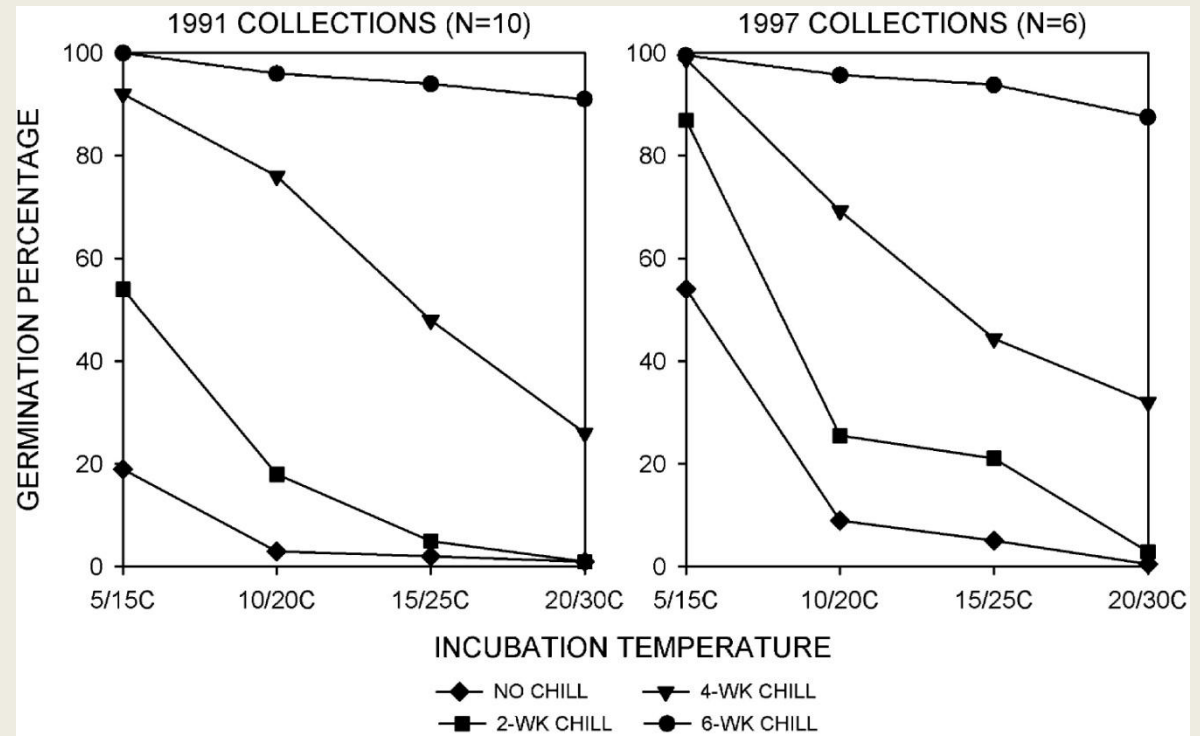
Plant-Soil Interactions

- Soils generally have well-developed biological soil crusts
- Seedlings respond positively to soil crust microorganisms and VA mycorrhizae
- Soils are often highly erodible



Flowering, seed production, germination and establishment

- Wind pollinated
- Mass flowering and mast fruiting
- Seeds are cached by heteromyid rodents
- Seeds require chill to break dormancy
- Germination occurs in winter, followed by emergence in early spring



Blackbrush flowers



Mass flowering of blackbrush



Emerging seedling cache

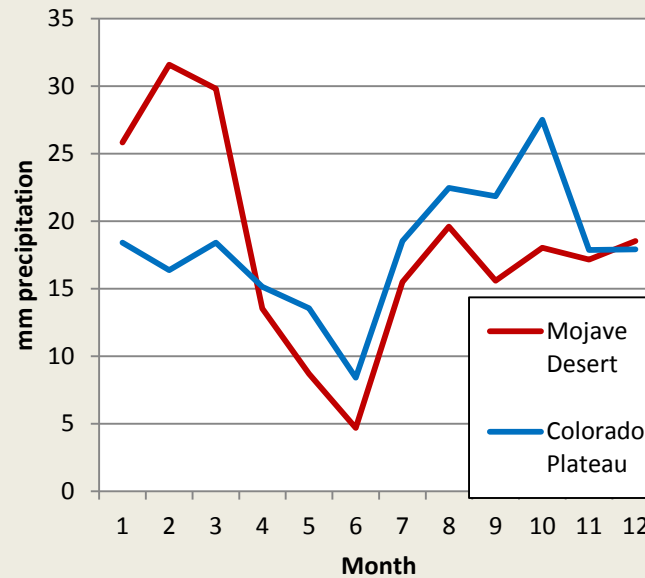
Plant-Herbivore Interactions



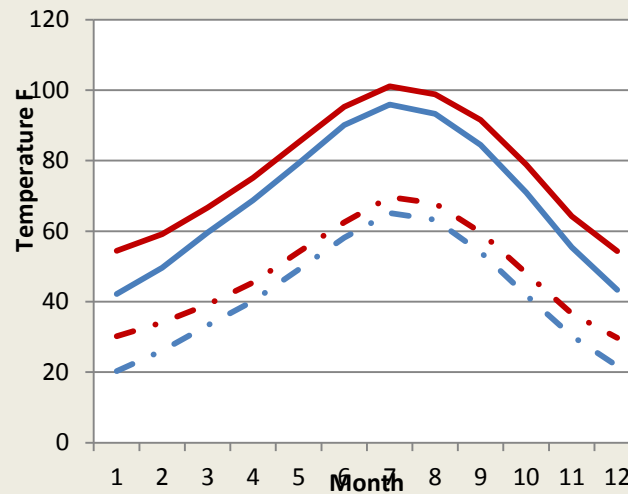
Precipitation patterns and water requirements for establishment



Red Rocks overlook – Mojave Desert



Colorado Plateau landscape



Viable Seed Banks Following Fire

- Recruitment following disturbance is seed-limited
- No persistent seedbank
- Seed movement into disturbed areas is limited by rodent behavior



Colorado Plateau pipeline recovery

Restoration Practices - What do we know?

Seed produced in mast years
can be stored for 12-15 years
without substantial loss in
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To increase restoration
success, planting should
mimic rodent caching in depth
and number

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Predator exclusion
or satiation may be
necessary

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Restoration Practices – What don't we know?

Planting techniques:

Deep pots ?

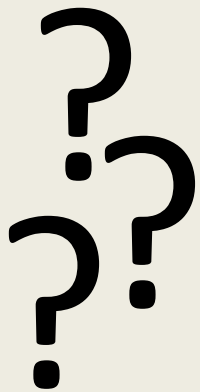
Hydrogels?

Seeding techniques:

Mimic caches?

Appropriate mixes?

Nurse plants?



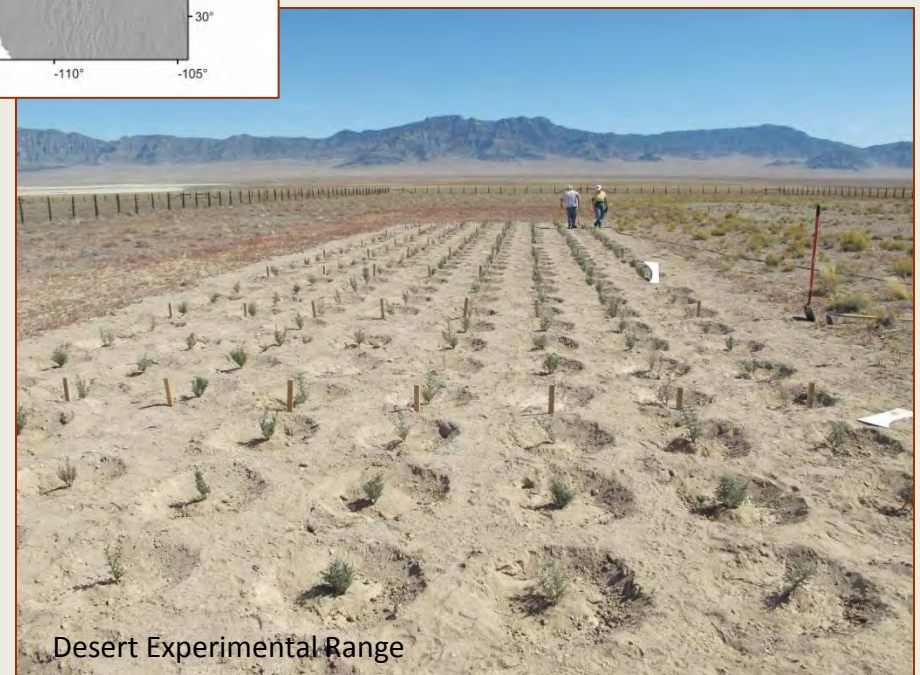
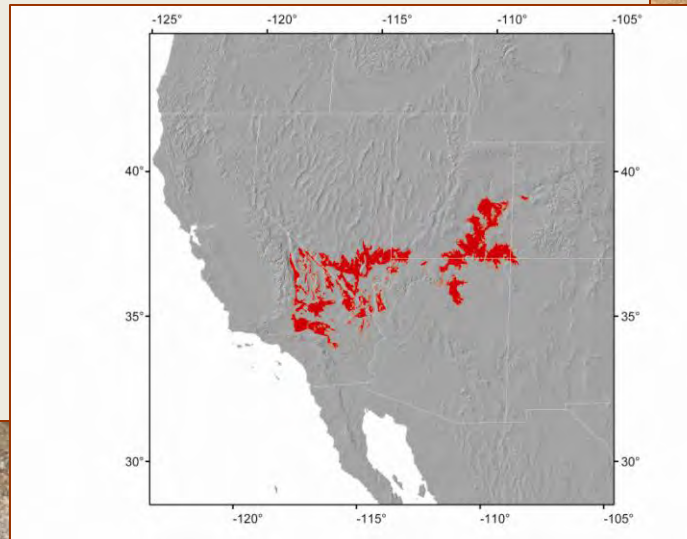
Seed transfer guidelines have
not yet been established

What are the variables that
define potential habitat?

Where will blackbrush be
In 60 years?

Current Research

- Predicted future range given climate change
- Common gardens
- Assisted migration?
- Blackbrush Symposium?



Thank you!

